



Growatt 18000TL3-HE

Growatt 20000TL3-HE

Installation & Operation Manual ►

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1.1 Documents use

1.1.1 Validity

This installation guide contains installation, commissioning, communication, trouble shooting. Information of Growatt HE inverters:

- Growatt 18000 TL3-HE
- Growatt 20000 TL3-HE

With this installation guide, users are able to install and operate the inverters easily.

This manual does not cover any details concerning equipment connected to the Growatt HE. Store this manual where accessible at all times.

1.1.2 Target Group

This manual is for qualified persons who will operate, maintenance and repair inverters.

1.1.3 Storage of the manuals







Stored in a cool and dry place for future reference

1.1.4 Additional Information

If you need further information on special topics please contact with GROWATT NEW ENERGY TECHNOLOGY CO., LTD.

1.2 Symbols Used

The following types of safety instructions and general information appear in this document as described below:

Symbol	Description
	Read the manual
 DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
 NOTICE	NOTICE indicates a situation which, if not avoided, could result in property damage.
 INFORMATION	INFORMATION that you must read and know to ensure optimal operation of the system.

2.1 Intended Use

Growatt HE inverters are grid-tied inverters which convert DC current generated by PV modules into AC current and feed it into the public grid in three-phase. Growatt HE inverters are multi-string inverters with single-MPP tracker, which means they are connected to the same PV module arrays.

Grid-tied PV system Overview:

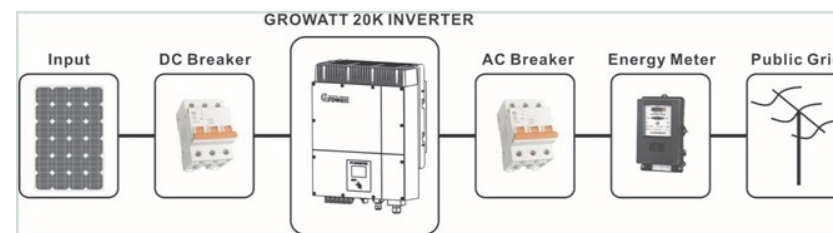









Fig 1.1

As drawing shown above, a complete Grid-tied PV system consists of PV modules, PV inverter, public grid and other components. Moreover, PV inverter always acts as a key component.







The Growatt HE inverters may only be operated with PV generators (modules and cabling) with protective insulation. Do not connect any source of energy other than PV modules to the Growatt HE inverters.

When it is needed to design a PV system containing a Growatt HE inverter or any other Growatt inverters, the system designing software ShineDesign (download from site: www.ginverter.com) will provide adequate supports.

2.2 Safety Precautions

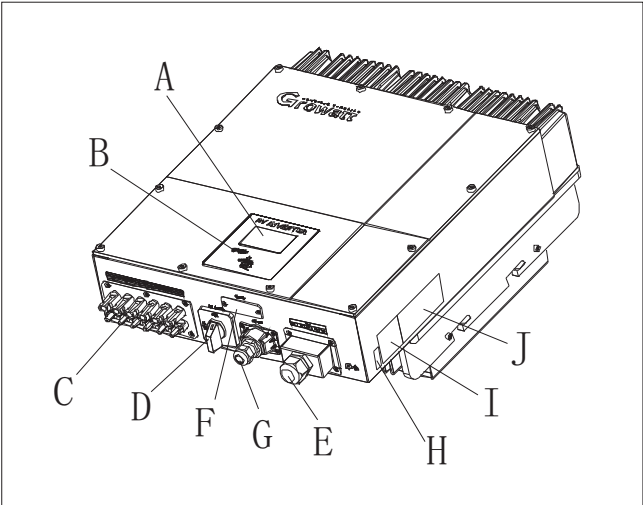
<div>   <p>DANGER</p> </div> <p>Danger to life due to high voltages in the inverter!</p> <ul style="list-style-type: none"> • All work on the inverter should be carried out by qualified personnel only. • The appliance should not be used by children or persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction. • Children should be supervised to ensure that they do not play with the appliance.
<div>   <p>DANGER</p> </div> <p>Danger of burn injuries due to hot enclosure parts!</p> <ul style="list-style-type: none"> • During operation, the front enclosure lid, the four sides of the enclosure lids and the heat sink may be hot.
<div>   <p>CAUTION</p> </div> <p>Possible damage to health as a result of the effects of radiation!</p> <p>Do not stay closer than 20 cm to the inverter for any length of time.</p>
<div>  </div> <p>Grounding the PV generator</p> <p>Comply with the local requirements for grounding the PV modules and the PV generator. Growatt recommends connecting the generator frame and other electrically conductive surfaces in a manner which ensures continuous conduction and ground these in order to have optimal protection of the system and personnel.</p>

2.3 Symbols on the inverter:

Symbol	Explanation
	Electrical voltage!
	Risk of burns!
	Point of connection for grounding protection.
	Direct Current (DC)
	Alternating Current (AC)
	CE mark. The inverter complies with the requirements of the applicable EC guidelines.

3Product Description

3.2 Type label



Position	Description
A	LCD
B	LED
C	PV input terminals
D	DC Switch
E	AC output
F	RS 232 lid
G	RS 485
H	Series Number
I	Warning Label
J	Type label

Symbol on the inverter

Symbol	Description	Explanation	
	Tap symbol	Indicates display operation (see Section 6).	
	Inverter status symbol	Green/constant	Operation
		Red/constant	1. Fault-- contact installer 2. Standby module
		Red/flashing	1. Fans Fault-- contact installer 2. Software update

3.2 Type label

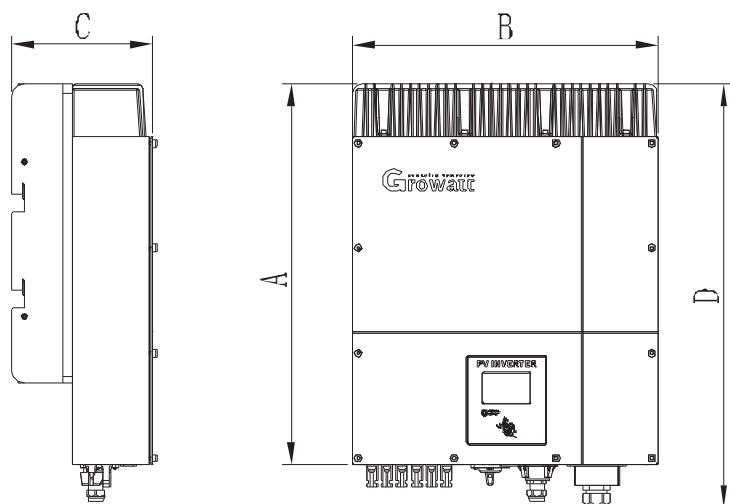
The type labels provide a unique identification of the inverter (The type of product, Device-specific characteristics, Certificates and approvals). The type label is on the right-hand side of the enclosure.

GROWATT PV Grid Inverter	
Model Name	xxxxxxxxxx
Max. DC voltage	xxxxxxxxxx
DC voltage range	xxxxxxxxxx
MPPT voltage range	xxxxxxxxxx
Max. input current per string	xxxxxxxxxx
Max. apparent power	xxxxxxxxxx
Normal output current	xxxxxxxxxx
Normal output voltage	xxxxxxxxxx
AC Frequency range	xxxxxxxxxx
Power Factor	0.9leading-0.9lagging
Safety Level	Class I
Protection Degree	IP65
Operation Ambient Temperature	-25°C - +60°C
VDE-AR-N4105, CEI 0-21,CE	
RD1669,VDE 0126-1-1, G59, IEC 62109	

More detail about the type label as the chart below:

Model Name	Growatt 18000TL3-HE	Growatt 20000TL3-HE
PV voltage range	400-1000Vdc	400-1000Vdc
MPPT voltage range	580V-800V	580V-800V
Max input current	33A	36A
Nominal AC voltage	3/N/ PE 230Vac/400Vac	3/N/ PE 230Vac/400Vac
AC power frequency	50Hz	50Hz
Max output current	26A	29A
Rated AC output power	18KW	20KW
Max AC apparent power	18KVA	20KVA
Max efficiency	99%	99%
Power factor	>0.99(can working at 0.8leading-0.8laging)	>0.99(can working at 0.8leading-0.8laging)
Interfaces:RS485/RS232	Yes/yes	Yes/yes
Protection class	Class I	Class I
Environmental Protection Degree	Ip65	Ip65
Operation temperature range	-25°C ~ +60°C	-25°C ~ +60°C

3.3 Size and weight



	A(mm)	B(mm)	C(mm)	D(mm)	Weight (kg)
Growatt 18000/20000 TL3-HE	615	510	235.5	690	52

3.4 The advantage of the Growatt HE inverters

The features of HE inverter are below:

- Integrated DC disconnect switch
- Bluetooth/ RF technology/ Zigbee/ Wifi
- Wide PV voltage range: 580V~1000V
- The maximum efficiency is 99%
- The Europe efficiency is 98.6%
- Ip65 environmental protection
- Easy to install

4 Unpacking

Before opening the packing box of Growatt HE, please note whether there are any visible external damages.

Once open the packing box, please check the delivery for completeness and for any visible external damages of the inverter. If there are anything damaged or missing, please contact your dealer. Complete delivery should contain as follows.

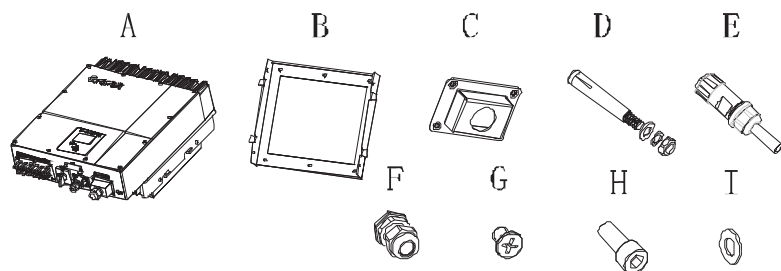


Fig 4.1

Item	quantity	Description
A	1	Growatt HE inverter
B	1	Mounting frame
C	1	Waterproof cover
D	6	Explosion screw
E	1	Cable gland for AC connection
F	4	M4 cross recessed countersunk head screws
G	3	M6 socket head cap screws
H	2	Flat mat
--	1	Warranty(not show in the picture)
--	1	User manual (not show in the picture)

Hint:

Number of D is 6 for Growatt 18000/20000 TL3-HE.

Notes:

Though the packaging box of Growatt HE is durable, please treat the packing box gently and avoid disposing the packing box.

Installation 5

5.1 Safety instruction



NOTICE

Before instructions, anyone includes qualified, trained personnel, must make sure you have read the section 2.1, about the General installation warnings.

5.2 Selecting the Installation Location

This is guidance for installer to choose a suitable installation location, to avoid potential damages to device and operators.

- 1) The wall selected to install the inverter must be strong and firm enough to support and bear the weight of the inverter for a long period time. (Refer to Chapter 12 Specifications)
- 2) The location selected must be suitable for inverters' dimension. (Refer to 3.3 Dimensions and Fig.5.2 Required Clearances)
- 3) Do not install the inverter on structures constructed of flammable or thermo labile materials.
- 4) Never install the inverter in environment of little or no air flow, nor dust environment.
- 5) The Ingress Protection rate is IP65 which means the inverter can be installed outdoors and indoors.
- 6) Do not expose the inverter to direct sunlight, in order to avoid the power and efficiency derating caused by excessive heating.
- 7) The humidity of the installation location should be 0~95% without condensation. The ambient temperature of the inverter should be -25℃~+60℃.
- 8) The installation location must be freely and safely to get at all times.
- 9) Vertically installation and make sure the connection of inverter must be downwards. Never install horizontal and avoids forward and sideways tilt.(Refer to drawings below)

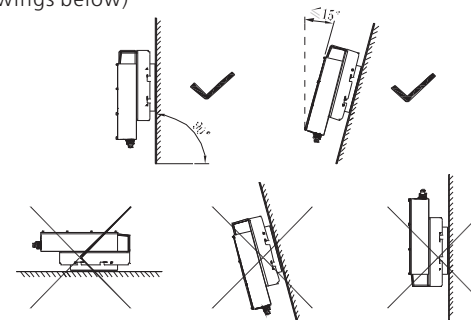


Fig 5.1

- 11) Notice the minimum clearances of the inverter. (Refer to 3.3 Dimensions and Fig.5.2 Required Clearances).

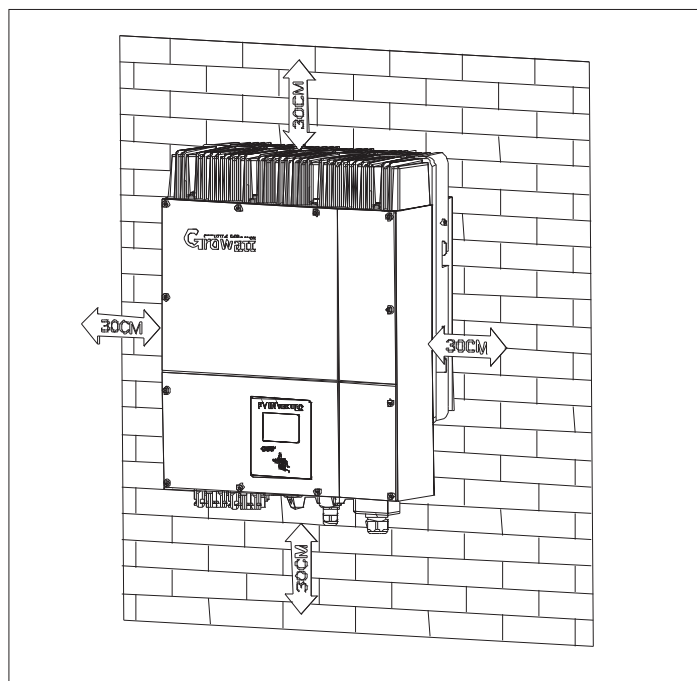
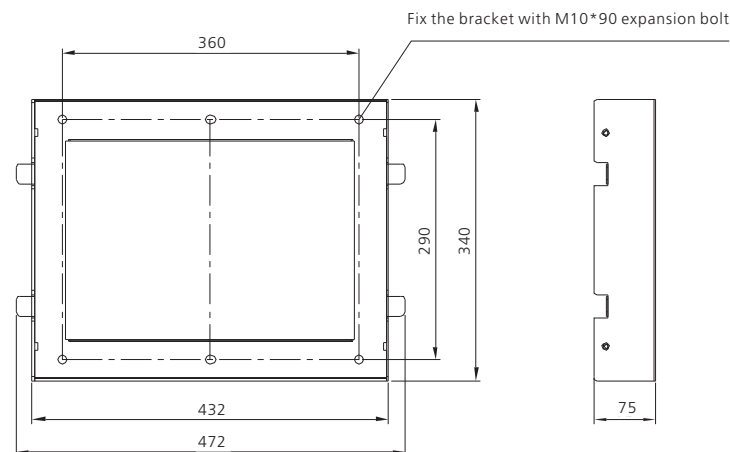


Fig 5.2

- 12) Do not install the inverter near television antenna or any other antennas and antenna cables.
 13) Do not install the inverter in living area, the noise caused by the machine may affect on daily life.
 14) For security reasons, don't install the inverter in place where the children can reach.

5.3 Installation guidance

To mount the inverter on the wall, we should mount the bracket to the wall firmly first of all.



Bracket of Growatt 18000/20000TL3-HE

Fig 5.3

Hint: Data units in mm

Steps:

- Drill holes for screws while use the mounting frame as template 6 for Growatt HE.
- Fix the mounting frame on the wall as the figures shown below, combine as the screws as the Items Fig 4.1 shows (items D)

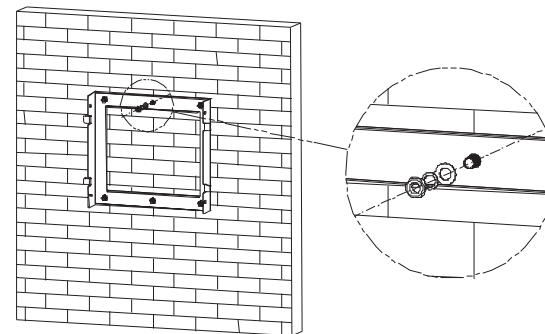


Fig 5.4

Notes: Never mount the inverter on the bracket unless you are sure that the mounting frame is really firmly mounted on the wall after carefully checking.

5.3.2 Mounting Inverter



WARNING

Falling equipment can cause serious or even fatal injury, never mount the inverter on the bracket unless you are sure that the mounting frame is really firmly mounted on the wall after carefully checking.

After the bracket is firmly mounted on the wall, then mount the inverter on the bracket.

- Rise up the Growatt HE a little higher than the bracket. Considering the weight of Growatt HE, you need to hang on the inverter. During the process please maintain the balance of the Growatt HE.
- Hang the inverter on the bracket through the match hooks on bracket and the back of the inverter.
- Installed one M6*10 screw at each side of inverter to reliable fixed it on the wall. Please reference in Fig 5.5(b).
- Connect the inverter to the earth. Please reference in Fig5.6.
- Recommend awning installation, the purpose is to extend the inverter service life and reduce the power derating of the inverter.

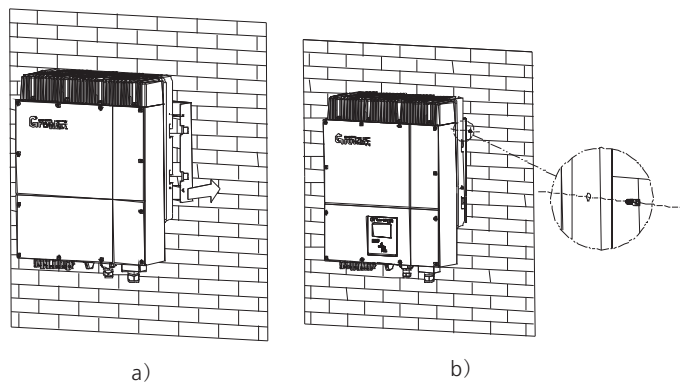


Fig 5.5

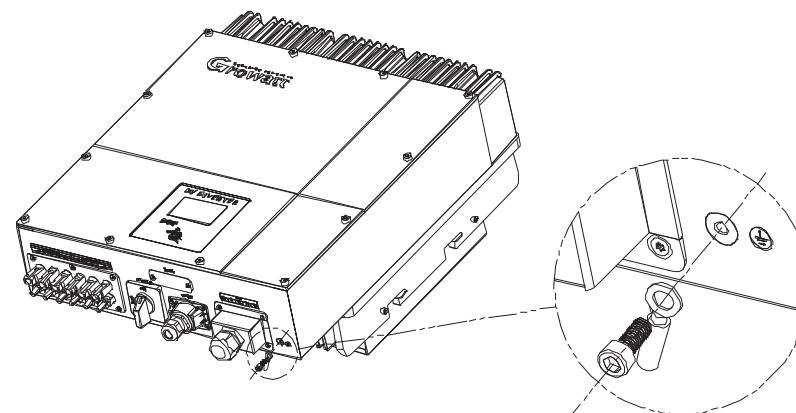


Fig 5.6

5.3.3 Installation layout



INFORMATION

Avoid exposing inverter to direct sunlight, rain or snow to extend the inverter service life despite the IP65 protection degree. Exposure to the sunlight may cause additional internal heating which will cause power derating. Shaded site of the building is preferred, otherwise, we recommend installing an awning, the detail is showed in Fig5.9:

More than one inverter need to be installed, the dimensions below should be considered.

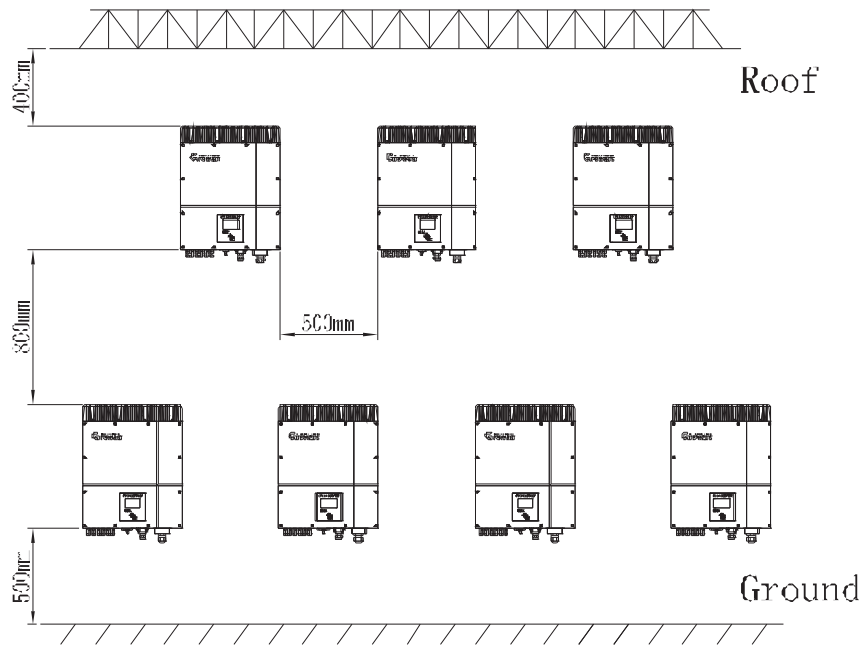


Fig 5.7



Fig 5.8

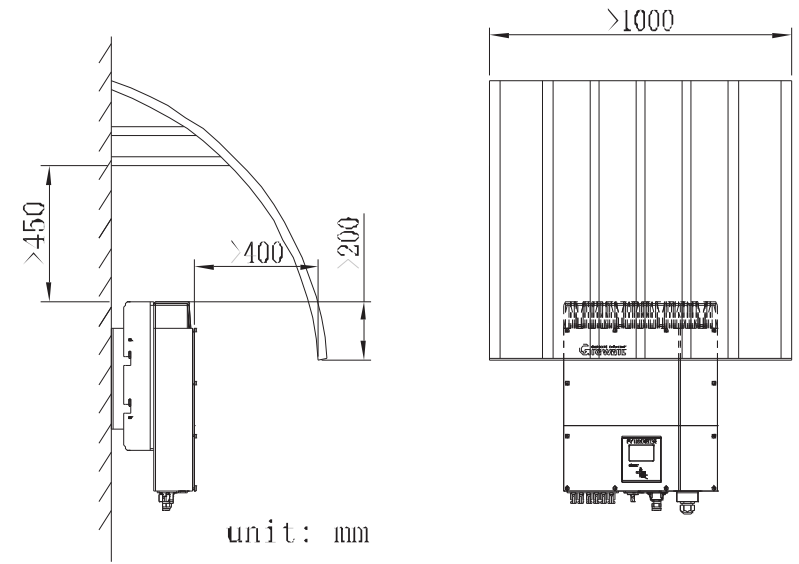


Fig 5.9

5.4 Electrical Connections

5.4.1 Safety



NOTICE

Before instructions, anyone includes qualified, trained personnel, must make sure you have read the section 2.1, about the General installation warnings.

5.4.2 Wiring AC Output

You must install a separate three-phase circuit-breaker or other load disconnection unit for each inverter in order to ensure that the inverter can be safely disconnected under load.

- Measure the public grid voltage and frequency (Voltage: 400Vac; Frequency: 50Hz/60Hz; in 3-Phase);
- Open the breaker between the PV inverter and utility;
- Screw's tensional force is 1Nm ;

Specification of AC breaker: Growatt 18000/20000 TL3-HE: 45A/400V
Cable requirements:

Model	Diameter(mm)	Area(mm²)	AWG
Growatt 18000 TL3-HE	2.59~4.11	6~16	10~6
Growatt 20000 TL3-HE	2.59~4.11	6~16	10~6

Conductor Cross section	Max. cable length(m)	
	Growatt 18000 TL3-HE	Growatt 20000 TL3-HE
6.0 mm²	27	25
10.0 mm²	40	36
16.0 mm²	59	53

AC connector type	Available wire gauge(mm²)
Connector 1	6.0-10.0

There are four types of AC connector for Growatt HE inverters. Please follow the instructions corresponding to the parts we offer you.

AC connector:

- 1) The AC side terminals of the inverter are like the following figure, it is clear to confirm that 'L1, L2, L3' represents three live line output, 'N' represents neutral line and \oplus is grounding line.
- 2) Connect five standard cables into relevant terminals. The five cables should be put through the protection shell, as figure below.

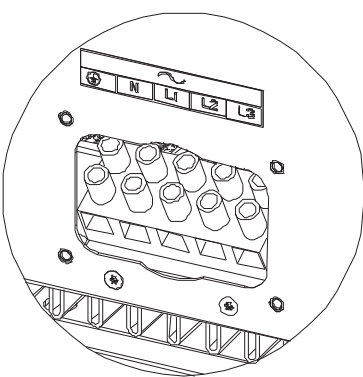


Fig 5.10

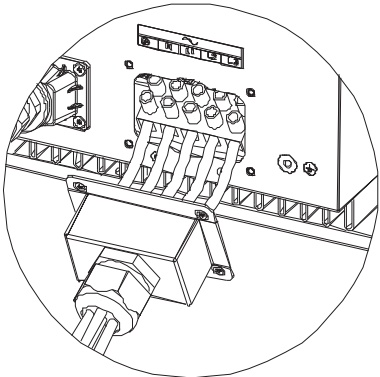


Fig 5.11

- 3) Fasten the protection shell onto the bottom of the inverter, make sure the four screws are tightened, the completed appearance is like the below figure

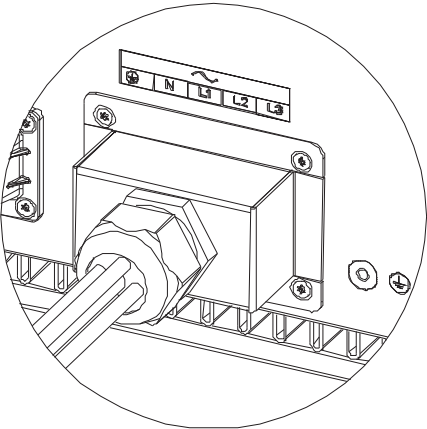


Fig 5.12

5.4.3 Wiring DC Input



DANGER

Danger to life due to lethal voltages!

Before connecting the PV array, ensure that the DC switch and AC breaker are disconnect from the inverter. NEVER connect or disconnect the DC connectors under load.



WARNING

Improper operation during the wiring process can cause fatal injury to operator or unrecoverable damage to the inverter. Only qualified personnel can perform the wiring work.



WARNING

Risk of damage to the inverter.
If the voltage of the PV modules exceeds the maximum input voltage of the inverter, it can be destroyed by the overvoltage. This will void all warranty claims.
Do not connect strings to the inverter that have an open-circuit voltage greater than the maximum input voltage of the inverter.



WARNING

To reduce the risk of electric shock, avoid touching the live components and treat the terminals carefully.



INFORMATION

Please use the same brand male and female PV connectors.
Under any conditions the total circuit current should never exceed the Max. Current.



NOTICE

Excessive voltages can destroy the measuring device
Only use measuring devices with a DC input voltage range up to at least 1,000 Vdc.

- 1 Check the connection cables of the PV modules for correct polarity and make sure that the maximum input voltage of the inverter is not exceeded.
- 2 The diagram drawing of DC side is shown as below, notice that the connectors are in paired (male and female connectors). The connectors for PV arrays and inverters are H4 (AMPHENOL) connectors;

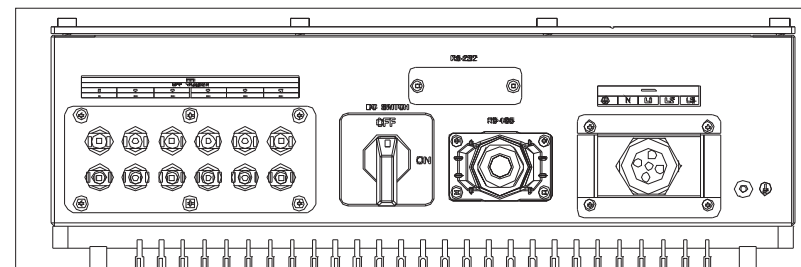


Fig 5.13

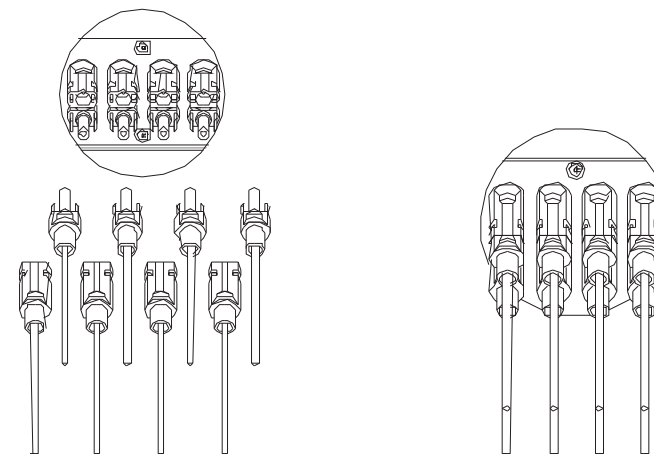


Fig 5.14

- 1 Check the assembled DC connectors for correct polarity and connect them to the inverter.
- 2 The maximum string current is showed as below.

Type	Max.current
Growatt 18000 TL3-HE	33A
Growatt 20000 TL3-HE	36A

- 3 In order to seal the inverter, all unneeded DC inputs must be closed with sealing plugs:
Cable requirements:

Model	Diameter(mm)	Area(mm²)	AWG
Growatt 18000 TL3-HE	2.05	3.332	12
Growatt 20000 TL3-HE	2.05	3.332	12

5.4.4 Grounding

AC Grounding

The Growatt HE must be connected to the AC grounding conductor of the power distribution grid via the ground terminal (PE).

PV Grounding

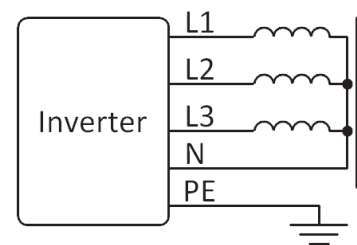
The grounding conductor in the framework of the PV array must be connected to the PV grounding conductor and the DC grounding conductor. The cross-section of the grounding conductor corresponds to the cross-section of the largest conductor in the DC system.

DC Grounding Conductor

A DC grounding conductor may be required by the Authority Having Jurisdiction (AHJ). Use the terminal block for the PV grounding conductor and DC grounding conductor.

Ground kit

If PV modules of the PV system require POSITIVE or NEGATIVE to connect to GROUND, the output of inverter should connect to grid with an isolating transformer. The connection method is below:

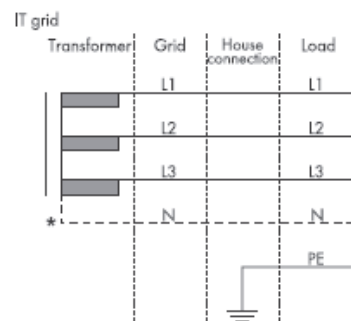
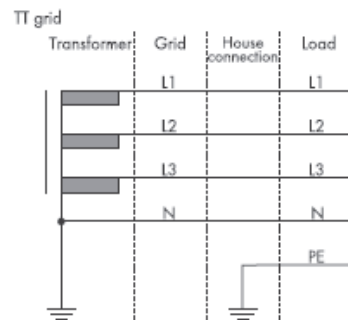
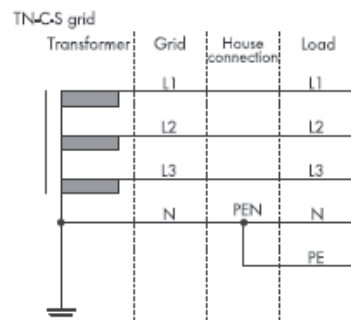
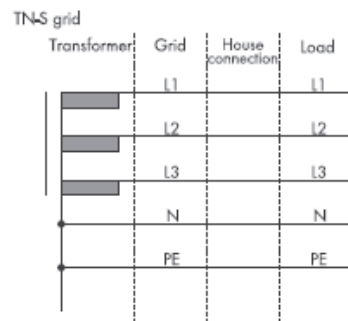
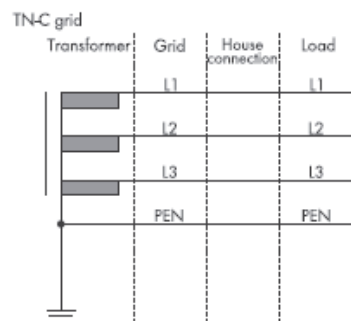


N of transformer should not be connected to PE.

5.5 Grid Type

5.5.1 Common grid type

Based on the local GRID standards, it may select different connection types. In the following you will find an overview of the most common type of grid structure.



5.5.2 Compatibility Table

Inverter	TN-C grid	TN-S grid	TN-C-S grid	TT grid	IT grid
Growatt 18000 TL3-HE	yes (N and PE of inverter both should connect to PEN of grid.)	yes	yes	yes if UN-PE < 30V	no
Growatt 20000 TL3-HE	yes (N and PE of inverter both should connect to PEN of grid.)	yes	yes	yes if UN-PE < 30V	no



INFORMATION

If the output of inverter was connected to grid with an isolating transformer, and the inverter display PV Isolation Low error during when you start-up the inverter, please set the parameter "Enable Neutral" via Growatt software Shinebus.

6 Commissioning

6.1 Commission the Inverter

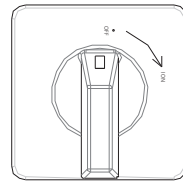


Fig 5.15

- 1) Remove all covers from the PV array.
- 2) Switch on the AC breaker.
- 3) Turn the DC Disconnect to position "I" .
- 4) If the inverter is connected with PV panel arrays and the input voltage is higher than 300Vdc, while the AC grid is not connected yet, LCD will display messages in order as below:
 - Company info ➡ Basic info ➡ State info
 - The LCD will display " AC V outrange "at State info and the LED turns red.
 - Please check all information on the LCD, operate by knocks you will see the different parameters.
 - State info ➡ (single knock) Input info ➡ (single knock) Output info ➡ (single knock) ➡ E_day power curve
- 5) Turn on the AC breaker between inverter and grid, the system will operate automatically.
- 6) Under normal operating conditions, the LCD displays 'Power: xx.xx Kw' at State info, this is the power feed into grid. The LED turns green.
- 7) Finish commissioning.

6.2 Operation Modes

6.2.1 Normal Mode

In this mode, the inverter works normally and LED turns green.

- Whenever the DC voltage is higher than 590Vdc, inverter converts power to grid as generated by the PV panels;
- Whenever the DC voltage is lower than 570Vdc, the inverter will work in waiting state and attempt to connect the grid. In waiting state the inverter consumes just enough power generated by the PV panel to monitor the internal system.

Notes: The inverter starts up automatically when DC power from the PV panel is sufficient.

6.2.2 Fault Mode

The internal intelligent controller can continuously monitor and adjust the system status. If inverter finds any unexpected conditions such as system fault and inverter fault, the fault information will be displayed on the LCD. In fault mode the LED turns red.

- Notes:
- a) Detailed fault information refers to Chapter 10.2 ERROR messages displayed on LCD.
 - b) When PV Isolation error occurred in SAA safety standard, the buzzer will give an alarm every fifteen seconds.

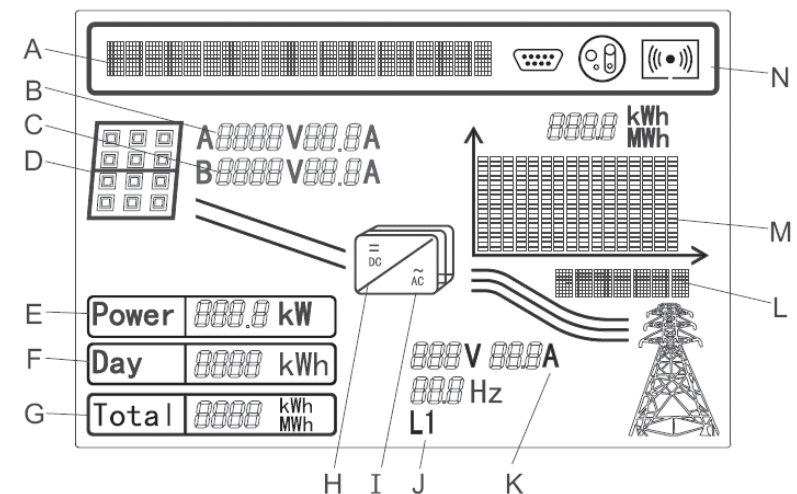
6.2.3 Shutdown Mode




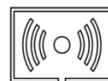
Inverters automatically stop running during periods of little or no sunlight. In shutdown mode the inverters take no power from the grid and panel, and the LCD and LED turns off.

Notes: If the PV string DC voltage is too low, the inverter will also turn to Shutdown Mode.

6.3 M3 LCD Display

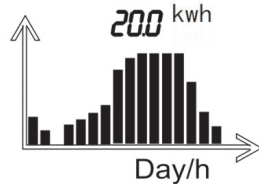
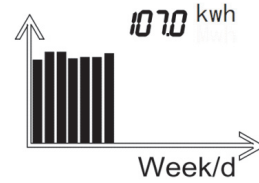
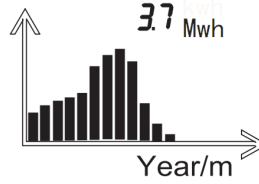
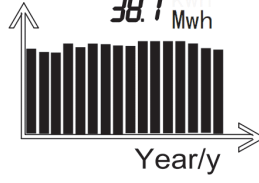
6.3.1 Graphic display



Position	Detail	
A	Text line for displaying an event	
B	Input voltage and current of MPPTA	
C	Input voltage and current of MPPTB	
D	PV array A and B, Light when the array voltage is above the start voltage(300Vdc)	
E	Current power	
F	Daily energy	
G	Total energy generated since the inverter was installed	
H	Light when the array voltage is above the start voltage(300V)	
I	Lighted when "H" is lighted and feed-in	
J	Output phase of the line conductor, switch every 5 seconds.	
K	Output voltage /current /frequency of the line conductor	
L/M	Graphical display of the inverter energy/power	
		RS 232 communication
		RS 485 communication
		External wireless communication
		Internal wireless communication

6.3.2 Graph

The inverter energy and/or power is shown as a graph on the display. The lower right-hand bar of the graph represents the current unit of time: Day/h, Week/day, Month/M, Year/Y. The top bar of the graph represents the maximum value of the graph values. The daily graph is displayed by default. You can trip the enclosure lid three times to switch the current unit of time and the generation information.

	The graph shows recent 16 hours of power generation and the maximum value power.
	The graph shows recent 7 days of power generation and the maximum value power.
	The graph shows recent 12 months of power generation and the maximum value power.
	The graph shows recent 16 years of power generation and the maximum value power

6.3.3 Text line

The Text line is used for displaying an event. Including the information of setting language, models, communication address, and time. The "Power Rate" and "Power Factor" are take turn to display by default. You need input "123" before enter into the setting interface.

You can operate the inputting "123":

- 1) Single knock the enclosure lid until the text line switch to the text as follow:



- 2) Double knock, the text will show "input123:000".



- 3) Double knock the enclosure lid ready to input password. Single knock to change value of first, double knock enter into next position.



- 4) Knock the enclosure lid three times to enter into setting interface.



- 5) Knock the enclosure lid four times to exit setting interface.

You can operate the settings as follow:

a) Setting language

- 1) Knock the enclosure lid once every time until the text line switch to the text as



- 2) Knock the enclosure lid twice and the text will show the language.



- 3) You can choose the language by tripping the enclosure once; the language includes English, Deutsh, Espanol, Francais, Italiano.

- 4) Then you can trip the enclosure three times to confirm the language you have chosen. And the text line change as follow:



The language is set!

b) Setting Com Address



INFORMATION

Knock the enclosure lid once every time until the text line switch to the text as follow:

- 1) Single knock until the text line switch to the text as follow:



- 2) Double knock the enclosure lid and the lower number text "1" will flash: 001.

- 3) If you want to change it, single knock to change it from 0 to 9.



- 4) If you want to set the address more larger, double knock the enclosure lid to let the higher number text "002" flashing. And single knock the enclosure lid to change it from 0 to 9. So as the highest number text. In the general condition, the maximum number of the address is within 32.



- 5) Then you can knock the enclosure three times to confirm the address you have set. And the text line change as follow:



The Com Address is set!

- c) Switching the RS232 and the External wireless communication



INFORMATION

As the Serial communication with the computer and the external wireless communication using the same serial port, we have to choose one. The RS232 is communicating to computer so that the computer can be connected to the inverter using our software tools. The RS232 is chose by default in the inverter.

- 1) Trip the enclosure lid once every time until the text line switch to the text as follow:



- 2) Double knock the enclosure lid and switching to external wireless communication.



- 3) Then knock the enclosure three times to confirm it. And the text line change as follow:



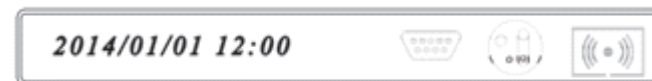
The External wireless communication is set!

- d) Setting date and time

- 1) Single knock the enclosure lid until the text line switch to the text as follow(the time maybe different depends on the inverter):



- 2) Double knock the enclosure lid and the text will switch to the year "2012", and the two lower numbers "2012" will flash, you can change it by single knock.



- 3) Double knock the enclosure lid and switching to the month "01", and it will flash. Then you can change it by single knock.



- 4) So as to setting the day and the time.



- 5) Then you need knock the enclosure three times to confirm it. And the text line



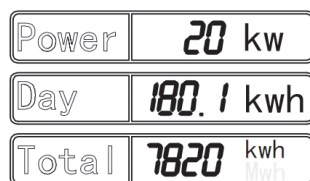
The date and the time are set!



You can set all above by Growatt software 'shinebus' with computer. For further information please go to the site: www.growatt.com.

6.3.4 Power display

The power and energy of the inverter are displayed in three fields: Power, Day and Total. The display is updated every five seconds.



Power

The power is that the inverter is currently feeding into the electricity grid.

Day

The energy fed into the electricity grid on this particular day. This equals the energy generated from the inverter's start-up in the morning to the current time.

Total

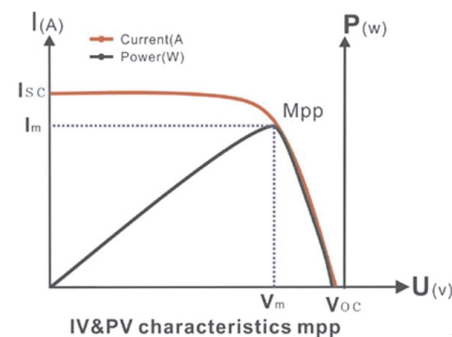
The total energy is that the inverter has fed into the electricity grid during its entire operating time.

Measurement accuracy

The display values may deviate from the actual values and must not be used for billing purposes. The inverter's measurement values are required for the operational control and to control the current to be fed into the electricity grid. The inverter does not have a calibrated meter.

6.4 Single MPPT of the Growatt HE

The Growatt HE includes one input section to process single string with MPPT, high speed and precise MPPT algorithm for real-time power tracking and energy harvesting, as well as transformerless operation for high performance, the max conversion efficiency is up to 99%. The wide input voltage range makes the inverter suitable to low power operation as well as the high power operation.



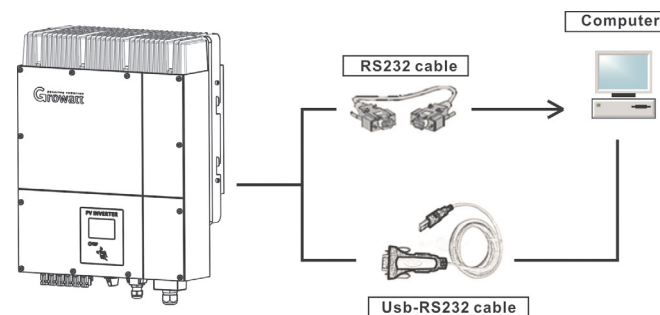
6.5 Communication

6.5.1 Using shinebus to set the information of the inverter

About the software of shinebus and the usage of it please download from the web: www.growatt.com



The connecting diagram as follow:

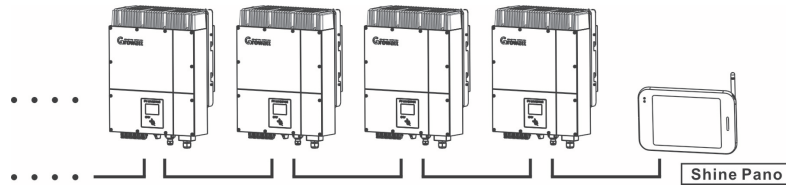


6.5.2 Monitor the inverters

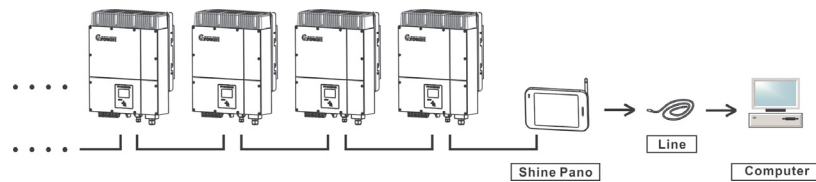
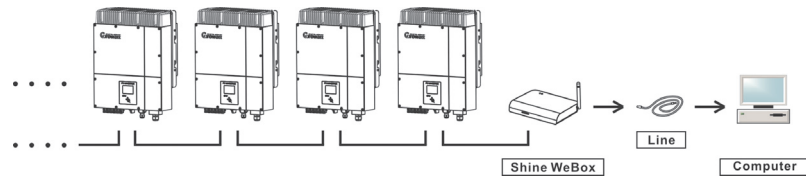
The inverter provides RS485 interface and RS232 interface to communicate with remote PC or logger. User can monitor the inverter state via the following types of communication systems.

Plan A:

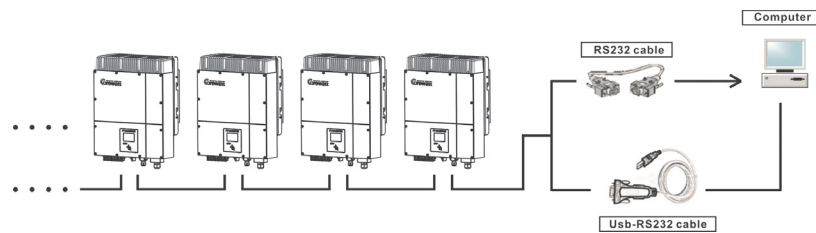
- Through RS485 interface-Data logger.



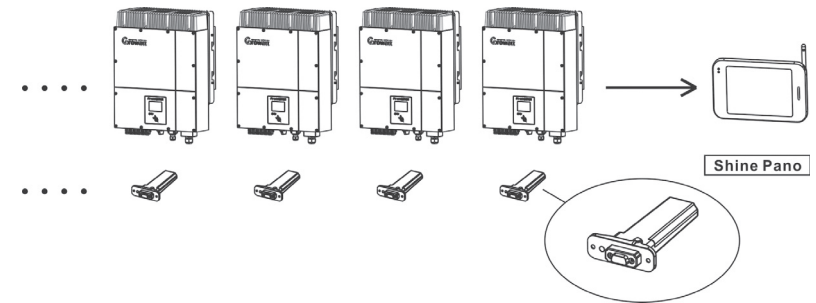
- Through RS485 interface-Data logger-PC.



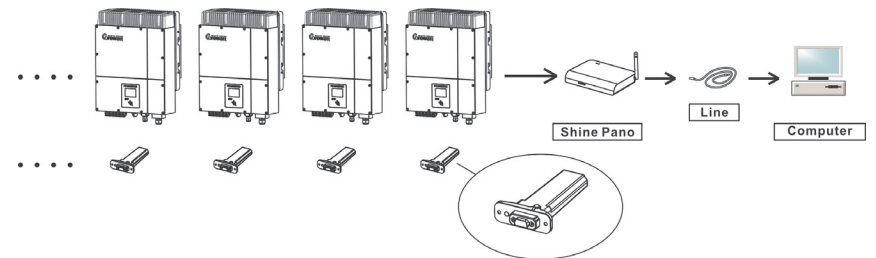
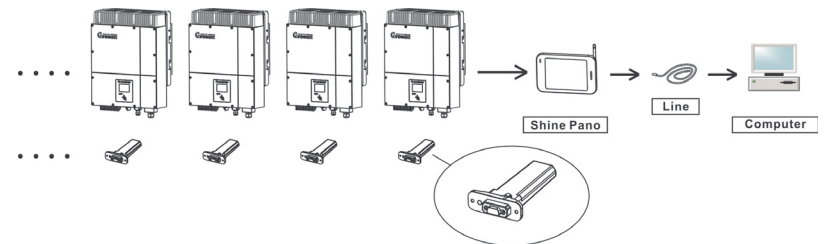
- Through RS485 interface-RS485-232 /RS232 converter-PC.



- Through RS232 interface- wireless module-Data logger.

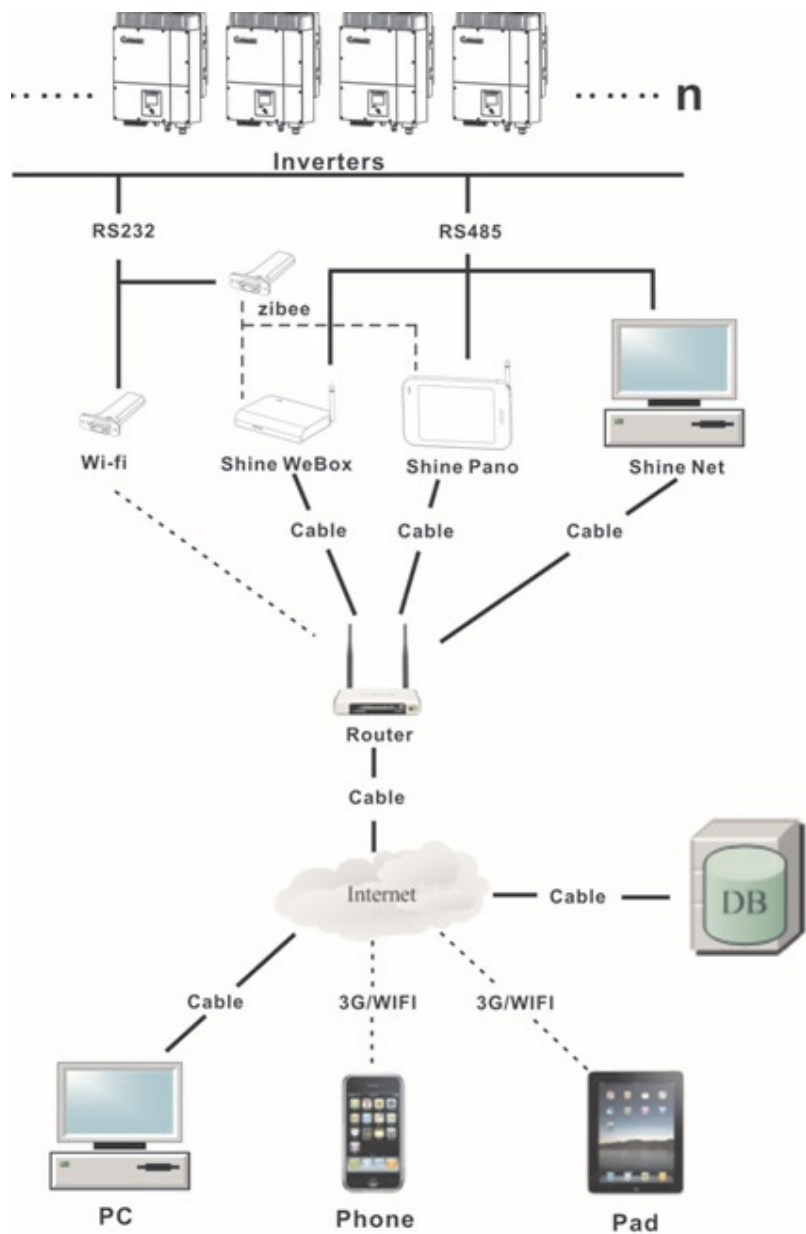


- Through RS232 interface- wireless module-Data logger-PC.



- Through RS232 interface- wireless module-Data logger-Internet.

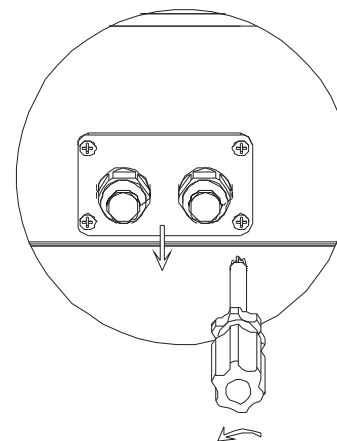
Plan B



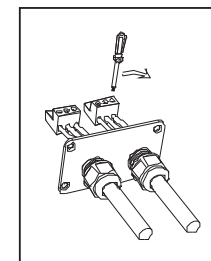
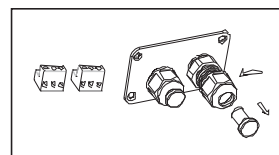
Notes: When three phase inverter and single-phase inverter shared a RS485 communication line, the total length of which does not exceed 1km.

6.5.3 RS485 cable connection

1. Please loosen four screws, take down the RS485 waterproof cover from inverter. If you don't choose RS485 as communication method, keep it on the inverter.



2. Slightly loosen the swivel nut, remove the filler-plug from the M16 cable gland.

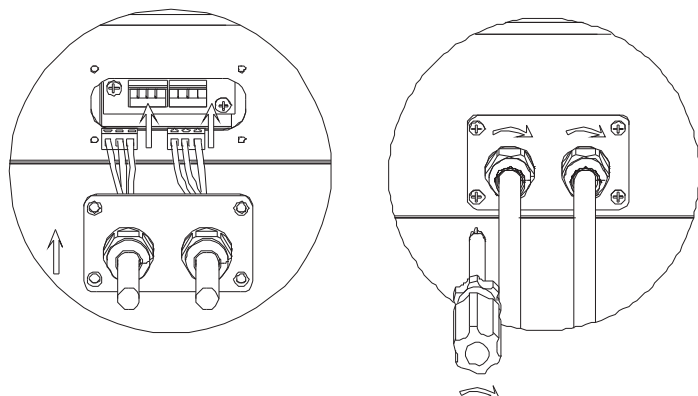


3. Make the cable through the hole of waterproof connector and put the cable into the RS485 terminals, fix all cables with screwdriver ('1'to'1', '3'to'3', '2' to the shielding layer or no connection.). The type of cable is recommended as "KVVRP22/2*1.5mm²".



NOTICE: Pull cables outwards to confirm whether they are installed firmly

4. Plug in two terminals. Cover the fix board.

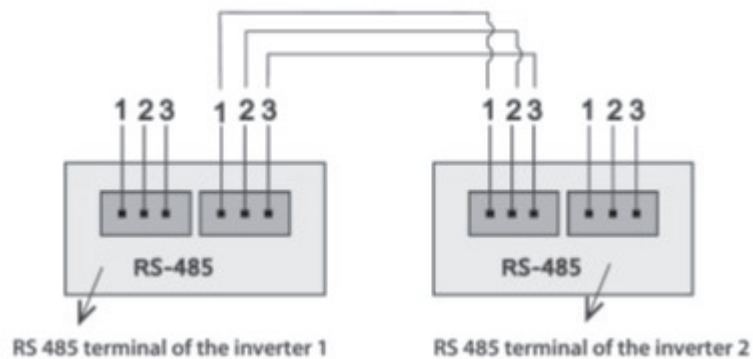


NOTICE: Tighten 4pcs screws first, then tighten water-proof terminals.

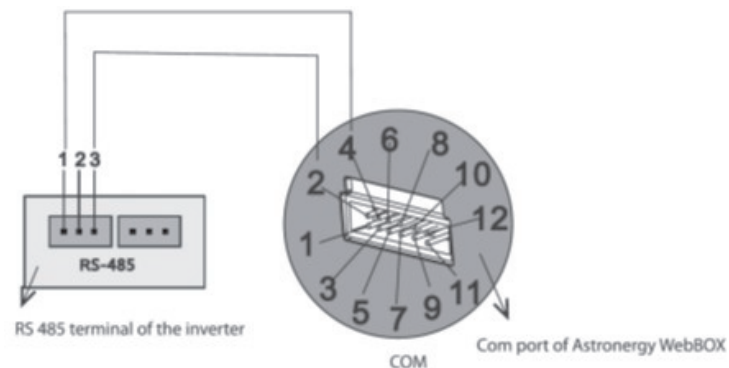
5. Tighten 4pcs screws and water-proof terminals.

Note:

1) As to the connection between inverters, please refer to the following figure.



2) As to the connection between inverter and ShineWebBox (ShinePano), please refer to the following figure.



7 Start-Up and shut down the inverter

7.1 Start-Up the inverter

1. Turn on the AC grid breaker;
2. Turn on the DC switch of the inverter, and the inverter will start automatically when the input voltage is higher than 400V.

7.2 Shut down the Inverter

1. Turn off the AC grid breaker;
2. Turn off the DC switch of the inverter.
3. Check the inverter operating status.
4. Until the display of LCD goes out, the inverter is shut down.

Maintenance and Cleaning 8

Heat dissipation is important to reduce the power derating when HE inverters working under high ambient temperature. HE inverters are natural cooling concept without fan. hot air is escaped from the top heatsink.

Once the output power is derating because of too high warming, one tip can help you solve such problem:

- Ventilation of installation location is poor. Choose appropriate installation location before mounting.

Trouble shooting 9

Our quality control program assures that every inverter is manufactured to accurate specifications and is thoroughly tested before leaving our factory. If you have difficulty in the operation of your inverter, please read through the following information to correct the problem.

9.1 General question

For general question, please visit www.ginverter.com, and find the Q&A column.

9.2 Error Messages displayed on LCD

An error message will be displayed on the LCD screen when a fault occurs. The faults consist of system fault and inverter fault.

You may be advised to contact Growatt in some situation, please provide the following information.

Information concerning the inverter:

- Serial number
- Model number
- Error message on LCD
- Short description of the problem
- Grid voltage
- DC input voltage
- Can you reproduce the failure? If yes, how?
- Has this problem occurred in the past?
- What was the ambient condition when the problem occurred?

Information concerning the PV panels:

- Manufacturer name and model number of the PV panel
- Output power of the panel
- Voc of the panel
- Vmp of the panel
- Imp of the panel
- Number of panels in each string

If it is necessary to replace the unit, please ship it in the original box.

9.2.1 System fault

System fault (system faults are mainly caused by system instead of inverter, please check the items as instructed below before replacing inverter).

Error message	Description	Suggestion
ACV Outrange	Utility grid voltage is out of permissible range.	1.Check grid voltage. 2.Check AC wiring, especially the ground wire. 3.If the error message still exists despite the grid voltage being within the tolerable range, contact Growatt.
ACF Outrange	Utility grid frequency out of permissible range.	1.Check AC wiring and grid frequency. 2.If the error message is displayed despite the grid frequency being within the tolerable range, contact Growatt.
PV Isolation Low	Insulation problem	1.Check if panel enclosure ground properly. 2.Check if inverter ground properly. 3.Check if the DC breaker gets wet. 4.Check the impedance of PV (+) & PV (-) between ground (must be more than 1 MΩ). If the error message is displayed despite the above checking passed, contact Growatt.
Residual I High	Leakage current too high	1.Restart invert 2.If error message still exists, contact Growatt.
Output High DCI	Output current DC offset too high	1.Restart inverter. 2.If error message still exists, contact Growatt.
PV Voltage High	The DC input voltage is exceeding the maximum tolerable value.	1.Disconnect the DC wire immediately. 2.Check the voltage of each PV string with multimeter. 2.If the voltage of PV strings are lower than 1000V(+15V), contact Growatt.

Auto Test Failed	Auto test didn't pass.	Restart inverter, repeat Auto Test, if problem still exist, contact Growatt.
Overtemperature	Temperature detection is failed	1.Restart invert 2.If error message still exists, contact Growatt.

9.2.2 Inverter fault

Error code	Meanings	Suggestion
Error: 101	Communication board has not received data from control board for 10 seconds. Electromagnetic Interference cause communication problem.	1.Restart inverter by cutting off DC supply, and Error message will disappear. 2.If the error 101 is often displayed, the environment Electromagnetic Interference is too strong. Contact Growatt.
Error: 103	EEPROM fault.	Restart inverter, if problem still exist, Contact Growatt.
Error: 117	Relay fault.	Restart inverter, if problem still exist, Contact Growatt.
Error: 119	GFCI fault.	Restart inverter, if problem still exist, Contact Growatt.
Error: 121	Control board has not received data from Communication board for 5S.	Restart inverter, if problem still exist, Contact Growatt.

9.2.3 Inverter warning

Warning code	Meanings	Suggestion
Warning103	Fail to read EEPROM.	Restart the inverter. If the warning still exist, please contact Growatt customer service to replace the COM board.
Warning 105	Fail to write EEPROM.	Restart the inverter. If the warning still exist, please contact Growatt customer service to replace the COM board.

10 Manufacturer Warranty

This certificate represents a 5 year warranty for the Growatt inverter products listed below. Possession of this certificate validates a standard factory warranty of 5 years from the date of purchase.

Warranted products

This warranty is applicable solely to the following products:

Growatt 1500, Growatt 2000, Growatt 3000, Growatt 4000, Growatt 5000, Sungold 1500, Sungold 2000, Sungold 5000, Growatt 3600MTL, Growatt 4200MTL, Growatt5000MTL Growatt 3600MTL-US, Growatt 4200MTL-US, Growatt 5000MTL-US, Growatt 10000UE, Growatt 12000UE, Growatt 18000UE, Growatt 20000UE, Growatt 18000 TL3-HE, Growatt 20000 TL3-HE.

Limited Product Warranty

(Applicable under normal application, installation, use and service conditions) Growatt warrants the above listed products to be free from defects and/or failure specified for a period not exceeding five (5) years from the date of sale as shown in the Proof of Purchase to the Original purchaser.

The warranties described in these "Limited Warranties" are exclusive and are expressly in lieu of and exclude all other warranties, whether written, oral, expresser implied, including but not limited to, warranties of merchantability and of fitness for a particular purpose, use, or application, and all other obligations or liabilities on the part of GROWATT, unless such other obligations or liabilities are expressly agreed to it in writing signed and approved by GROWATT, GROWATT shall have no responsibility or liability whatsoever for damage or injury to persons or property, or for other loss or injury resulting from any cause whatsoever arising out of or related to the modules, including, without limitation, any defects in the modules or from use or installation. Under no circumstances shall GROWATT be liable for incidental, consequential or special damages howsoever caused; loss of use, loss of production, loss of revenues are therefore specifically and without limitation excluded to the extent legally permissible, GROWATT's aggregate liability, if any, in damages or otherwise, shall not exceed the invoice as paid by the customer.

The "Limited Product Warranties" described above shall not apply to, and Growatt shall have no obligation of any kind whatsoever with respect to, any inverter which has been subjected to:

- Misuse, abuse, neglect or accident;
- Alteration, improper installation or application;
- Unauthorized modification or attempted repairs;
- Insufficient ventilation of the product;
- Transport damage;
- Breaking of the original manufacturers seal;
- Non-observance of Growatt installation and maintenance instruction;
- Failure to observe the applicable safety regulations

- Power failure surges, lighting, flood, fire, exposure to incorrect use, negligence, accident, force majeure, explosion, terrorist act, vandalism or damage caused by incorrect installation, modification or extreme weather conditions or other circumstances not reasonably attributable to Growatt.

The warranty shall also cease to apply if the product cannot be correctly identified as the product of Growatt. Warranty claims will not be honored if the type of serial number on the inverters have been altered, removed or rendered illegible.

Liability

The liability of Growatt in respect of any defects in its PV inverters shall be limited to compliance with the obligations as stated in these terms and conditions of warranty. Maximum liability shall be limited to the sale price of the product. Growatt shall accept no liability for loss of profit, resultant of indirect damage, any loss of electrical power and / or compensation of energy suppliers within the express meaning of that term.

The warranty rights as meant herein are not transferable or assignable to any third party excepting the named warranty holder.

Warranty Conditions

If a device becomes defective during the agreed Growatt factory warranty period and provided that it will not be impossible or unreasonable, the device will be, as selected by Growatt:

- Shipped to a Growatt service center for repair;
- Repaired on-site;
- Exchanged for a replacement device of equivalent value according to model and age.

The warranty shall not cover transportation costs in connection with the return of defective modules. The cost of the installation or reinstallation of the modules shall also be expressly excluded as are all other related logistical and process costs incurred by all parties in relation to this warranty claim.

11 Decommissioning

Specification 12

11.1 Dismantling the Inverter

1. Disconnect the inverter as described in section 7.
2. Remove all connection cables from the inverter.
3. Screw off all projecting cable glands.
4. Lift the inverter off the bracket and unscrew the bracket screws.



CAUTION

Danger of burn injuries due to hot enclosure parts!
Wait 20 minutes before disassembling until the housing has cooled down.

11.2 Packing the Inverter

If possible, always pack the inverter in its original carton and secure it with tension belts. If it is no longer available, you can also use an equivalent carton. The box must be capable of being closed completely and made to support both the weight and the size of the inverter.

11.3 Storing the Inverter

Store the inverter in a dry place where ambient temperatures are always between - 25°C and +60°C.

11.4 Disposing of the Inverter



Do not dispose of faulty inverters or accessories together with household waste. Please accordance with the disposal regulations for electronic waste which apply at the installation site at that time. Ensure that the old unit and, where applicable, any accessories are disposed of in a proper manner.

12.1 Specification of Growatt HE

Specification	Growatt 18000 TL3-HE	Growatt 20000 TL3-HE
DC input data		
Max. DC power	18700W	20800W
Max. DC voltage	1000V	1000V
Start DC voltage(feed to grid)	590V	590V
DC voltage range	400V-1000V	400V-1000V
MPP voltage range/nominal voltage	580V-1000V/580V	580V-1000V/580V
Full load DC voltage range	580V-800V	580V-800V
Max. DC current	33A	36A
Max. number of parallel strings	1	1
AC output data		
Max. AC apparent power	18kVA	20kVA
Nominal AC power	18kVA	20kVA
Max AC current	26A	29A
Nominal AC voltage; Range	3/N/PE 230V/400V 184~275V	3/N/PE 230V/400V 184~275V
AC grid frequency; Range	50/60Hz -6Hz/+5Hz	50/60Hz -6Hz/+5Hz
Power factor	0.8leading~0.8lagging	0.8leading~0.8lagging
THDi	<3% (Full power output)	<3% (Full power output)
AC grid connection type	Three phase	Three phase
Efficiency		
Max. efficiency	99%	99%
Euro-eta	98.6%	98.6%
MPPT efficiency	99.5%	99.5%

Protection devices

DC reverse polarity protection	yes	yes
DC switch for each MPPT	yes	yes
Output over current protection	yes	yes
Output AC overvoltage Protection - Varistor	yes	yes
Ground fault monitoring	yes	yes
Grid monitoring	yes	yes
Integrated all-pole sensitive leakage current monitoring unit	yes	yes

General data

Dimensions (W / H / D) in mm	690/510/235 mm 27.2/20.1/9.3 inch	690/510/235 mm 27.2/20.1/9.3 inch
Weight	52kg/115.6lb	52kg/115.6lb
Ambient temperature range	- 25 °C~+60 °C (- 13 °F~+140 °F) With derating above 45 °C (113 °F)	52kg/115.6lb
Noise emission (typical)	≤45 dB(A)	≤45 dB(A)

Altitude

Self-consumption night	<0.5 W	<0.5 W
Topology	Transformerless	Transformerless
Cooling concept	Natural	Natural
Environmental Protection Rating	Ip65	Ip65
Relative humidity	0~95% Non-condensing	0~95% Non-condensing

Features

DC connection	H4/MC4(opt)	H4/MC4(opt)
AC connection	Screw terminal	Screw terminal
Display	LCD	LCD
Interfaces: RS232/RS485/Bluetooth/Rf /Zigbee/Wi-Fi	yes/yes/opt/opt /opt/opt	yes/yes/opt/opt /opt/opt
Warranty: 5 years / 10 years	yes /opt	yes /opt
Certificates and approvals	CE, CGC, etc.	CE, CGC, etc.

12.2 DC connector info

H4 Specification:

Contact size	2.5mm2/14AWG	4mm2/12 AWG	6mm2/10 AWG	6mm2/10 AWG
Rated current (at 90°C)	32A	40A	44A	65A
Rated current (at 90°C)	600V DC(UL) 1000V DC(TUV)			
Contact resistance	0.25mΩ TYP			
Degree of protection(mated)	Ip68			
Socket contact material	Copper, Tin plated			
Insulation material	Thermoplastic, UL94 V-0			
Ambient temperature range	-40°C to +90°C			
Strip length	7.0mm(9/32)			
Cable jacket diameter	4.5 to 7.8mm(3/16: to 5/16")			

12.3 Torque Values

Enclosure lid screws	1.3Nm(10.8 lbf.in)
Shell and RS232 screws	0.7Nm(6.2 lbf.in)
AC terminal	1.8Nm(16.0 lbf.in)
AC connector 1 & 2	1.0Nm(9 lbf.in)
M6 socket head cap screws for securing the enclosure at the bracket	2Nm(18 lbf.in)
Additional ground screws	2Nm(18 lbf.in)
Fans screws	1Nm(9.0 lbf.in)

12.4 Spare Parts and Accessories

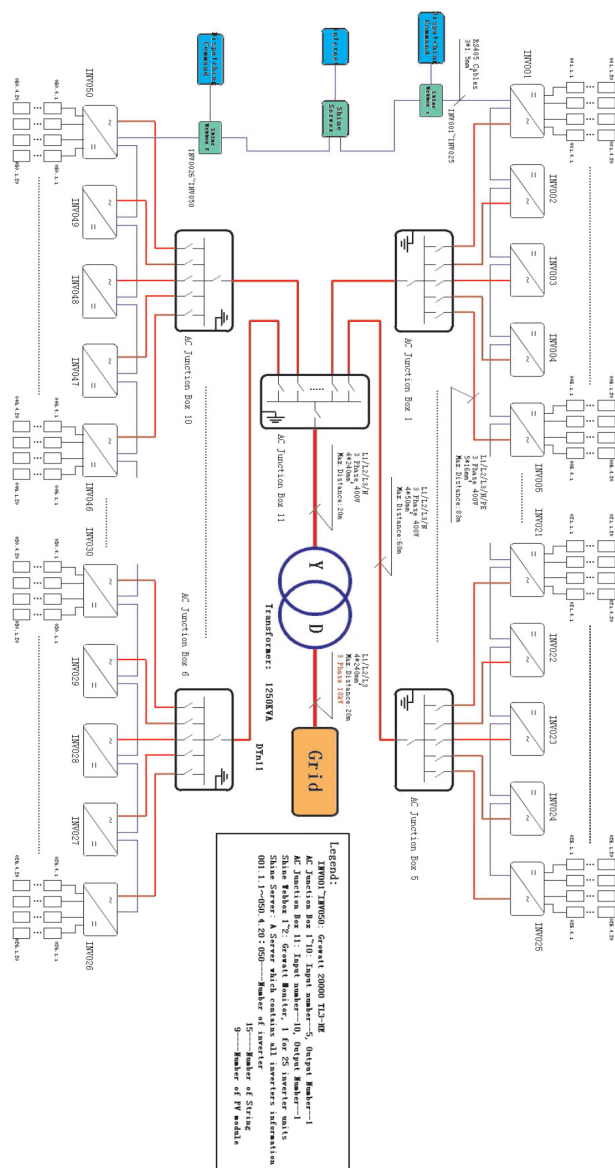
In the following table you will find the optional accessories for your product. If required, you can order these from GROWATT NEW ENERGY TECHNOLOGY CO., LTD or your dealer.

Name	Description	Growatt order number
Shine Webbox	Communication data logger	MR00.0001700
Shine Pano	Communication data logger	200.0004900
Shine Vision receiver	Communication data logger emitter	MR00.0000201
Shine Vision emitter	Communication data logger emitter	MR00.0000601
Zigbee	Communication interface	200.0007000
Wi-Fi	Communication interface	MR00.0001400
Bluetooth	Communication interface	MR00.0002200

13 PV system installation

Certificates 14

Installation with multiple inverters on a three phase system:



Growatt UE is designed to use worldwide, hence the inverters meet different safety standards of variety countries and regions.

Model	Certificates
Growatt 18000 TL3-HE	CE,CGC
Growatt 20000 TL3-HE	CE,CGC

Contact 15

If you have technical problems concerning our products, contact your installer or Growatt. During inquiring, please provide below information:

1. Inverter type
2. Modules information
3. Communication method
4. Serial number of Inverters
5. Error code of Inverters
6. Display of inverters